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EXAMINER
LIU, LI

ART UNIT	PAPER NUMBER
2613	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/820,030	MURAYAMA, ATSUSHI	
	Examiner	Art Unit	
	Li Liu	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claim 17 is withdrawn in view of the newly discovered reference(s) to Osako (US 4,253,048). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4 and 12-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Osako (US 4,253,048).

1). With regard to claim 1, Osako discloses a multichannel photocoupler (Figure 3 or Figure 6) comprising:

at one or more input sides: one or more time division means (the Parallel to Serial Converter 102 in Figure 3, or 206 in Figure 6. The parallel to serial converter converts a stream of multiple data elements, receiver simultaneously, into a stream of data elements transmitted in time sequence. Or according to the "Fiber Optics Standard Dictionary", third Edition, by Martin Weik, the parallel to serial converter is a device that converts a group of simultaneous inputs on two or more parallel channels, often constituting a specific data unit, such as a byte or word, into corresponding time-

sequenced signal elements on a single channel. Therefore, the Parallel to Serial Converter is a time division means) for subjecting one or more input signals at one or more respective channels to time division; and

a light-emitting element (68 in Figure 3, or 306 in Figure 6) communicating at least one of the time-divided signal or signals to one or more output sides;

at one or more output sides: a light-receiving element (72 in Figure 3, or 310 in Figure 6) receiving at least one of the time-divided signal or signals from the light-emitting element; and

one or more output signal separation means (the Serial Parallel Converter 104, or 214 in Figure 6) for decoding at least one of the time-divided signal or signals and for outputting same to at least one of the respective channel or channels.

2). With regard to claim 2, Osako discloses a multichannel photocoupler according to claim 1 further comprising:

one or more synchronization means (the timing Pulse Generator 106, or 302 in Figure 6) for, in the event that one or more signals at at least one of the respective channel or channels is transferred from one or more input sides to one or more output sides, synchronizing the signal or signals through use of one or more prescribed clock signals (column 5 line 37-58, column 7 line 8-33).

3). With regard to claim 3, Osako discloses wherein: at least one of the synchronization means (the timing Pulse Generator 106, or 302 in Figure 6) at at least one of the input side or sides, in the event that one or more input signals at at least one of the respective channel or channels is subjected to time division through use of one or

more prescribed clocks, generates one or more start bits before one or more signals at one or more first channels (column 5, line 41-44, in synchronism with the timing pulse from the timing pulse generator 106, the parallel-serial converter 102 converts the bit parallel digital signal to the bit serial digital signal, or column 6, line 42-46); and

at least one of the synchronization means (the timing Pulse Generator 106 or 302 in Figure 6 sends timing signal to the Serial Parallel Converter to detect the bits) at at least one of the output side or sides possesses functionality for detecting at least one of the start bit or bits.

4). With regard to claim 4, Osako discloses the multichannel photocoupler comprising, as one or more means (e.g., the photo-coupler 318) for transferring one or more clock synchronization signals from one or more input sides to one or more output sides:

at at least one of the input side or sides: a clock-signal-transfer light-emitting element (the light-emitting diode in photocoupler 318) other than the light-emitting element for transfer of one or more signals; and

at at least one of the output side or sides: a clock-signal-transfer light-receiving element (the photo-transistor in photocoupler 318) other than the light-receiving element for transfer of one or more signals.

5). With regard to claim 12, Osako discloses a multichannel photocoupler (Figure 3 or Figure 6) comprising:

an input circuit (the A-D Converter 62 in Figure 3, or 216 in Figure 6) for receiving at least one input electrical signal;

a time division circuit (the Parallel to Serial Converter 102 in Figure 3, or 206 in Figure 6) for time dividing said at least one input signal to produce a time divided signal;

an output side comprising a first light-receiving element (72 in Figure 3, or 310 in Figure 6);

a first light-emitting element communicating said time-divided signal from said input side to said output side; and

an output signal separation circuit (the Serial Parallel Converter 104, or 214 in Figure 6) for decoding said time-divided signal and outputting the decoded time divided signal as an electrical output signal.

6). With regard to claim 13, Osako discloses the multichannel photocoupler further comprising a clock circuit (the timing Pulse Generator 106, or 302 in Figure 6) for generating a clock signal and wherein said input circuit comprises clock signal transmitter (the light-emitting diode in photocoupler 318) and said output circuit comprises a clock signal receiver (the photo-transistor in photocoupler 318).

7). With regard to claim 14, Osako discloses multichannel photocoupler further comprising a clock circuit (the timing Pulse Generator 106, or 302 in Figure 6) for generating a clock signal and wherein said input circuit comprises clock signal transmitting circuit (the light-emitting diode in photocoupler 318) and said output circuit comprises a clock signal receiving circuit (the photo-transistor in photocoupler 318), wherein said clock signal transmitting circuit transmits a start bit and said clock signal receiving circuit is adapted to detect said start bit (column 5, line 41-44, in synchronism

with the timing pulse from the timing pulse generator 106, the parallel-serial converter 102 converts the bit parallel digital signal to the bit serial digital signal).

8). With regard to claim 15, Osako discloses wherein said clock signal transmitter comprises a second light-emitting element (the light-emitting diode in photocoupler 318) and said clock signal receiver comprises a second light-receiving element (the photo-transistor in photocoupler 318).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5, 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osako (US 4,253,048) as applied to claim 1 and 2 above, and in view of Reinhold et al (US 6,587,062).

1). With regard to claims 5 and 16, Osako discloses all of the subject matter as applied to claims 1, 2, 12 and 13 above. And Osako further discloses the multichannel photocoupler comprising, as one or more means (the light-emitting diode in photocoupler 318) for transferring one or more clock synchronization signals from one or more input sides to one or more output sides:

But, Osako does not expressly disclose the means to transfer of one or more clock synchronization signals simultaneous with one or more signals at at least one of

the respective channel or channels through use of the light-receiving element and the light-emitting element transferring one or more signals; or wherein said clock signal transmitter comprises said first light-emitting element and wherein said clock signal receiver comprises said first light-receiving element (claim 16).

However, to transfer clock synchronization signals simultaneous with one or more signals of the respective channel are well known in the art. Reinhold et al teaches a system and method to transfer clock synchronization signals (Figure 7, column 9 line 23-38) simultaneous with other respective signal channels through use of the light-receiving element and the light-emitting element transferring one or more signals.

Reinhold et al discloses that because both the clock information and the data information can be coupled to the DSP or digital filter using only a single optical isolator or other galvanic isolation device. This results in substantial cost savings, because galvanic isolation devices generally are very expensive.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use one emitting diode to transmit both the data signal and clock signal as taught by Reinhold et al to the system of Osako so that the clock signal transmitter comprises the first light-emitting element and the clock signal receiver comprises the first light-receiving element, and then the system cost can be reduced.

2). With regard to claim 6, Osako and Reinhold et al discloses all of the subject matter as applied to claims 1, 2 and 5 above. And Osako and Reinhold et al further discloses the multichannel photocoupler, as one or more means (the Parallel/Serial Converter and Drive Circuit of Osako, or the DSP of Reinhold et al) for distinguishing

between or among one or more clock synchronization signals and one or more signals at at least one of the respective channel or channels, one or more means:

for, at at least one of the input side or sides, varying one or more electric currents flowing at the light-emitting element so as to impart one or more differences to one or more optical intensities in one or more clock synchronization signals and one or more signals at at least one of the respective channel or channels transferred to at least one of the output side or sides (the parallel serial converter in synchronism with the timing pulse from the timing pulse generator converts the bit parallel digital signal to the bit serial digital signal, and the drive circuit varys electric currents flowing at the light-emitting element so as to impart differences to optical intensities in clock synchronization signal and data channel signals), and for causing same to be transferred to at least one of the output side or sides; and

for, at at least one of the output side or sides, separating one or more signals received at the light-receiving element and having one or more differences in one or more optical intensities into one or more signals at at least one of the respective channel or channels and one or more clock synchronization signals (column 5, line 49-58, and column 7, line 8-33).

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Osako (US 4,253,048).

Osako discloses all of the subject matter as applied to claims 12, 13 and 15 above. But, Osako does not expressly disclose wherein said first light emitting element

transmits light of a first intensity and said second light emitting element transmits light of a second intensity different than said first intensity.

However, since the drive circuit (e.g., 304 in Figure 6) of the first light emitting element transmits light and the drive circuit (e.g., 316 in Figure 6) of the second light emitting element are individual devices, the current generated by the two devices are different, therefore, the intensities from the two light emitting elements are indeed different.

Also, since the second light emitting element is used to transmit the clock signal, it is obvious to one skilled in the art to apply less power to the second light emitting element than the first light emitting element so to reduce the interference to the signal channels.

7. Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osako (US 4,253,048) in view of Slater (US 3,611,332) and Schimpf (US 3,492,432).

1). With regard to claim 7, Osako discloses a multichannel photocoupler comprising:

at one or more input sides: a light-emitting element (68 in Figure 3, or 306 in Figure 6) transferring one or more signals to at least one of the output side or sides; and

at one or more output sides: a light-receiving element (72 in Figure 3, or 310 in Figure 6) receiving one or more signals imparted with one or more changes in one or more optical intensities produced by the light-emitting element; and

one or more output signal separation means (the Serial Parallel Converter 104, or 214 in Figure 6) for decoding at least one of the signal or signals and for outputting same to at least one of the respective channel or channels.

But, Osako does not expressly disclose one or more level coupling means for carrying out level coupling with respect to one or more input signals at at least one of the respective channel or channels so as to impart one or more changes in one or more optical intensities at the light-emitting element and for causing same to be transferred to at least one of the output side or sides.

However, a level-coupled signals or the pulse amplitude modulation multiplexing is well known and widely used in the art for channels multiplexing so to transmit multi-channels through a single transmitter. Slater teaches a system and method for multiplexing several channels (Figures 1 and 2) using pulse amplitude modulation multiplexing. And another prior art, Schimpf, also teaches the pulse amplitude modulation multiplexing for multichannels (Figure 2, column 2, line 6-16).

Slater and Schimpf teach that the pulse amplitude modulation multiplexing can relax the bandwidth requirement. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the level-coupling or pulse amplitude modulation multiplexing techniques as taught by Slater and Schimpf to the system of Osako so that the bandwidth requirement can be relaxed.

2). With regard to claim 18, Osako discloses a multichannel photocoupler comprising:

an input circuit (the Parallel to Serial Converter 102 in Figure 3, or 206 in Figure 6) for receiving at least one electrical input signal and including a first light-emitting element (68 in Figure 3, or 306 in Figure 6);

an output circuit (the Serial Parallel Converter 104, or 214 in Figure 6) comprising a first light-receiving element element (72 in Figure 3, or 310 in Figure 6) receiving a signal from said first light-emitting element;

an output signal separation circuit (the Serial Parallel Converter and D/A Converter) for decoding and outputting said signal.

But, Osako does not expressly disclose a level coupling circuit for level coupling said at least one electrical input signal and changing an optical intensity at the light-emitting element.

However, a level-coupled signals or the pulse amplitude modulation multiplexing is well known and widely used in the art for channels multiplexing so to transmit multi-channels through a single transmitter. Slater teaches a system and method for multiplexing several channels (Figures 1 and 2) using pulse amplitude modulation multiplexing. And another prior art, Schimpf, also teaches the pulse amplitude modulation multiplexing for multichannels (Figure 2, column 2, line 6-16).

Slater and Schimpf teach that the pulse amplitude modulation multiplexing can relax the bandwidth requirement. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the level-coupling or pulse amplitude modulation multiplexing techniques as taught by Slater and Schimpf to the system of Osako so that the bandwidth requirement can be relaxed.

8. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Osako (US 4,253,048) and Slater (US 3,611,332) and Schimpf (US 3,492,432) as applied to claim 7 above, in further view of Geller (US 5,502,298).

Osako and Slater and Schimpf discloses all of the subject matter as applied to claim 7 above. And Osako and Reinhold 8. But, Osako does not disclose the multichannel photocoupler further comprising: one or more monitor light-receiving elements provided at at least one of the input side or sides; wherein one or more changes over time in one or more optical intensities at the light-emitting element is fed back to at least one of the level coupling means.

However, to monitor the output power of a the light-emitting element is a widely practice in the art so to control/stabilize the output power. Geller teaches such a monitor diode (Figure 3, column 4, line 5-23).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a monitor diode as taught by Geller to the system of Osako and Slater and Schimpf so that the output power of the light-emitting element can be controlled and the level-coupled signals can be demodulated.

9. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Osako and Reinhold et al and Slater and Schimpf and Geller as applied to claims 1-8 above, in further view of Noda et al (US 2002/0125837).

Osako and Reinhold et al and Slater and Schimpf and Geller disclose all of the subject matter as applied to claims 1-8 above. Osako further discloses wherein: one or

more output stages at at least one of the respective channel or channels comprises one or more transistor elements (the photo-transistor 72 and 310).

But, Osako does not expressly discloses wherein: one or more output stages at at least one of the respective channel or channels comprises one or more transistor elements; or thyristor elements; or triac elements.

However, the thyristor or triac elements are well known in the art. Noda et al teaches that both thyristor and triac can be used at the output stages of the photocoupler (page 4, [0054]). Therefore, it would have been obvious that the thyristor or triac elements can be used in the system of Osako et al. The limitations in claims 9-11 do not define a patentably distinct invention over that in Osako and Reinhold et al and Slater and Schimpf and Geller since both the invention as a whole and Osako and Reinhold et al and Slater and Schimpf and Geller are directed to couple multiple channels by a single photocoupler Therefore, to use a transistor or thyristor or triac would have been a matter of obvious design choice to one of ordinary skill in the art.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Matson (US 4,847,507).

Ditman et al (US 5,313,508).

Komoriya (US, 4,341,961).

Krause (US 5,883,395).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
August 14, 2007

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER